

CLAIMS

What is claimed is:

1. An inter-vehicle communication apparatus, comprising:
an inter-vehicle communication unit;
a network-forming processing section for forming a network with surrounding vehicles; and
an information-exchange processing section for performing information-exchange processing between network-forming vehicles,
wherein the network-forming processing section comprises a network-forming restriction section for restricting a network-forming area.
2. An inter-vehicle communication apparatus according to Claim 1, wherein the network-forming restriction section is a first-order-network restriction section for restricting the forming of a first-order network in which the inter-vehicle communication unit directly performs communications.
3. An inter-vehicle communication apparatus according to Claim 2, wherein the first-order-network restriction section sends at least a signal indicating the position of the vehicle to which the inter-vehicle communication apparatus is mounted, the position serving as a reference position, and a network-forming-request signal to surrounding vehicles by the use of a tentative PN code known to other vehicles, and
surrounding vehicles which receive both of the signals sequentially communicate with a network-forming-request-source vehicle at a timing specified in advance according to the positions of the surrounding vehicles relative to the reference position.
4. An inter-vehicle communication apparatus according to Claim 3, wherein the first-order-network restriction section counts the number of vehicles by signals sequentially sent from the surrounding vehicles to the network-forming-

request-source vehicle and stops receiving when the number of vehicles is equal to or larger than a predetermined value to restrict the forming of the first-order network.

5. An inter-vehicle communication apparatus according to Claim 3, wherein the surrounding vehicles sequentially communicate with the network-forming-request-source vehicle by the use of a free ID.

6. An inter-vehicle communication apparatus according to Claim 5, wherein the surrounding vehicles exchange genuine-ID data with the network-forming-request-source vehicle after the forming of the first-order network is restricted.

7. An inter-vehicle communication apparatus according to Claim 1, wherein the network-forming restriction section comprises a relay section for receiving a signal from another vehicle and for sending it to yet another vehicle.

8. An inter-vehicle communication apparatus according to Claim 7, wherein the network-forming restriction section restricts the number of times relay processes are performed by relay sections between when a vehicle sends information and when the network-forming-request-source vehicle receives the information.

9. An inter-vehicle communication apparatus according to Claim 7, wherein the network-forming restriction section restricts the network-forming area by making, in a relaying vehicle which receives a restriction signal from an information-requesting vehicle, the relay section not relay a signal.

10. An inter-vehicle communication apparatus according to Claim 1, wherein the network-forming restriction section restricts the network-forming area according to a distance from a specific position.

11. An inter-vehicle communication apparatus according to Claim 10, wherein the specific position is one of the center of balance or the center obtained

from the network to be formed, or the position of the vehicle to which the inter-vehicle communication apparatus is mounted.

12. An inter-vehicle communication apparatus according to Claim 10, wherein the distance from the specific position is set according to the number of vehicles included in the network to be formed.

13. An inter-vehicle communication apparatus according to Claim 10, wherein the specific position is a specific intersection.

14. An inter-vehicle communication apparatus according to Claim 1, wherein the network-forming restriction section restricts the network-forming area according to the time period which has elapsed from when information was requested.

15. An inter-vehicle communication apparatus according to Claim 1, wherein the network-forming restriction section restricts the network-forming area according to the type of information to be exchanged between network-forming vehicles.

16. An inter-vehicle communication apparatus according to Claim 1, wherein the network-forming restriction section comprises a storage section for storing in advance at least one restriction value.

17. An inter-vehicle communication apparatus according to Claim 1, wherein the network-forming restriction section restricts the network-forming area by making the inter-vehicle communication unit of the vehicle to which the inter-vehicle communication unit is mounted restrict processing for receiving information sent to the vehicle.

18. An inter-vehicle communication apparatus according to Claim 1, wherein the network-forming restriction section restricts the network-forming area by making an information-transmitting vehicle which has received a restriction

signal from an information-requesting vehicle not perform information-transmitting processing.

19. An inter-vehicle communication apparatus according to Claim 1, wherein the network-forming restriction section updates vehicles positioned in a network-forming restriction area in response to vehicle movement or the passage of time.

20. An inter-vehicle communication system, comprising:
an inter-vehicle communication apparatus located in each of a plurality of vehicles, said apparatus comprising:
an inter-vehicle communication unit for transmitting and receiving information between vehicles; and
a network-forming processing section for forming a network among at least some of said plurality of vehicles and restricting the size of the network based on at least one of a predetermined number of vehicles permitted in the network, a predetermined number of times a relay process can be performed between a vehicle transmitting information and another vehicle receiving information in the network, a distance of a vehicle from a specific position, and a predetermined time which has elapsed.

21. A method of operating an inter-vehicle communication system, comprising:
providing an inter-vehicle communication apparatus located in each of a plurality of vehicles, said apparatus including an inter-vehicle communication unit for transmitting and receiving information between vehicles; and
forming a network among at least some of said plurality of vehicles and restricting the size of the network based on at least one of a predetermined number of vehicles permitted in the network, a predetermined number of times a relay process can be performed between a vehicle transmitting information and another vehicle receiving information in the network, a distance of a vehicle from a specific position, and a predetermined time which has elapsed.